Gas Journal

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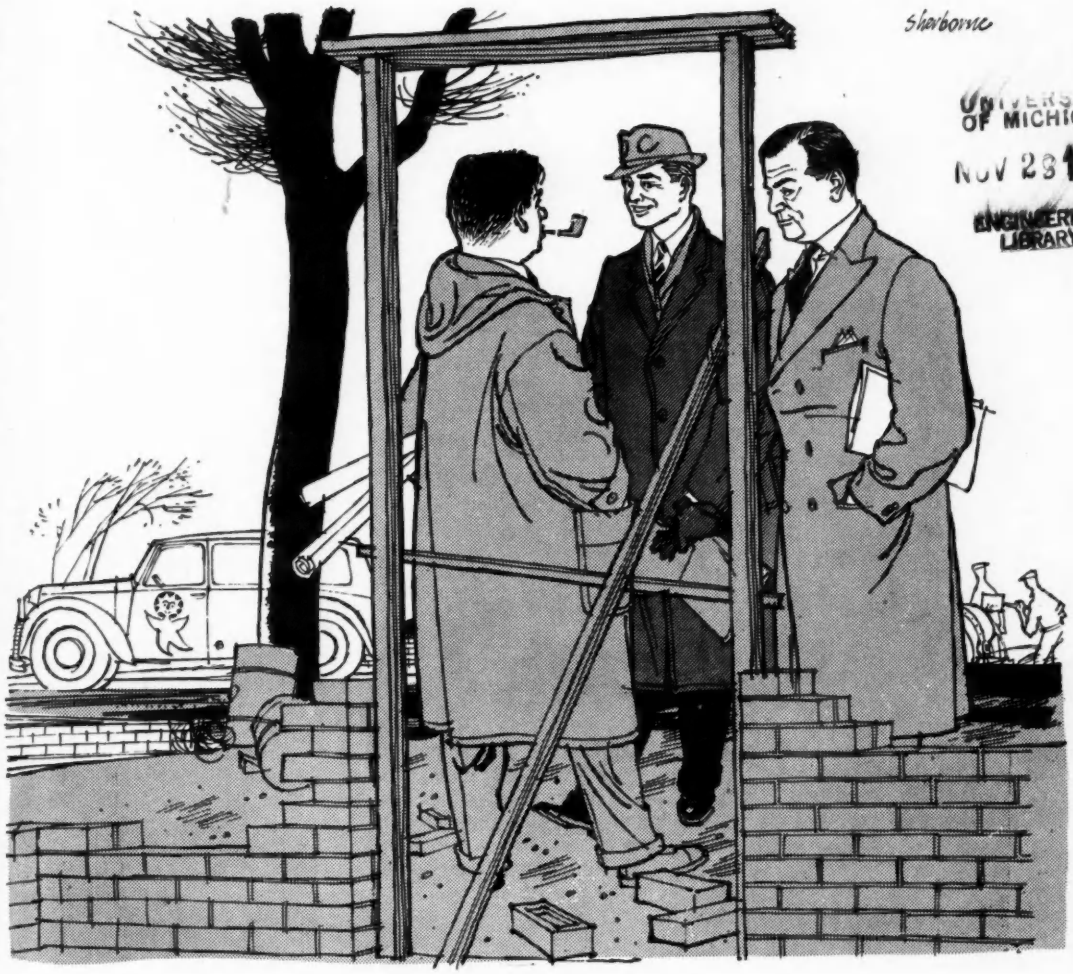

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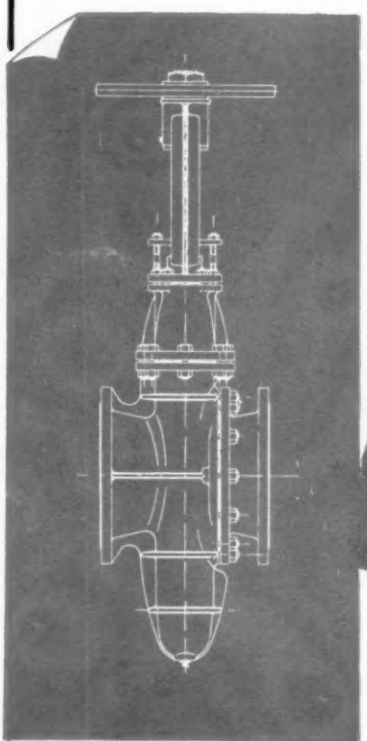

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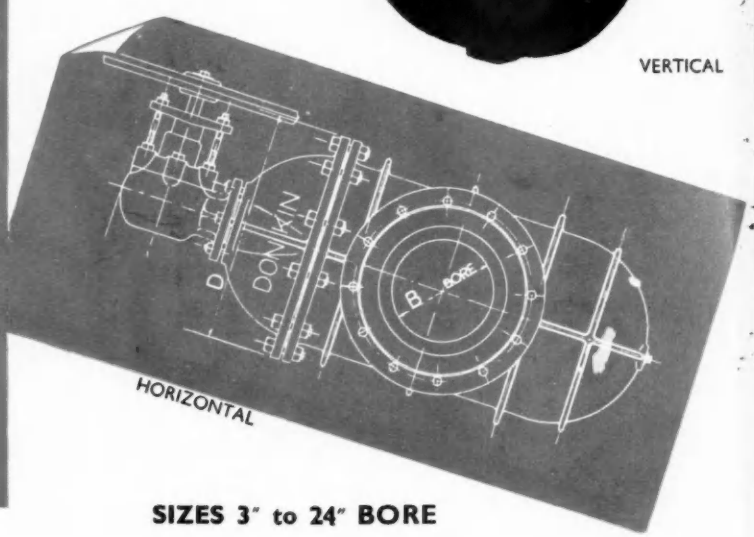

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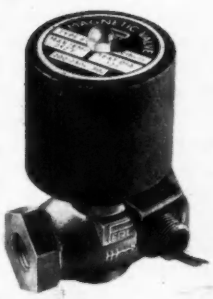

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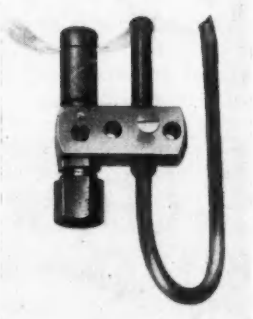

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Gas Journal

VOL. 296 *NO. 4973* *NOVEMBER 5, 1958*

110TH YEAR

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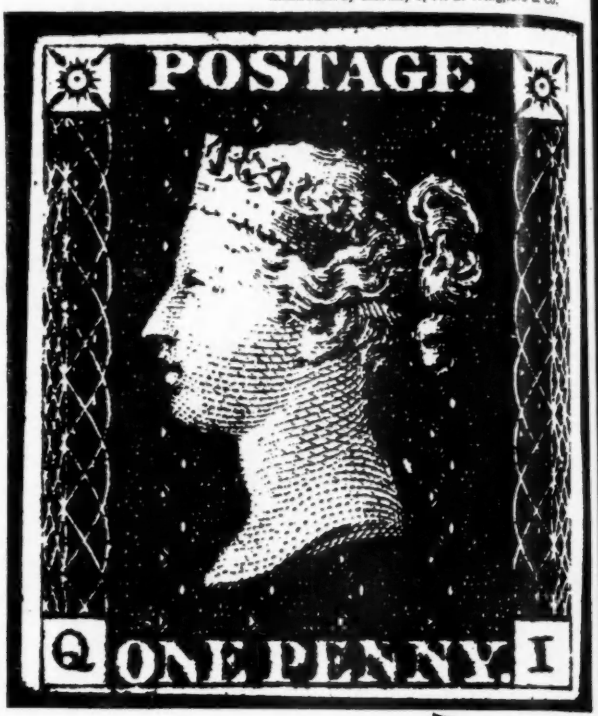

something in common

They remind one of different worlds, the 1d. black postage stamp of 1840, and the modern T.G. meter. Yet, they *have* something in common—both are the products of true craftsmanship. First issued on 6th May, 1840, the 1d. black was printed by Perkins, Bacon & Co. from an engraving by Frederick Heath. The design was based on a watercolour by Henry Corbould from the City Medal engraved by William Wyon, and is presented as a fine example of the engraver's art. The T.G. meter epitomizes craftsmanship and the T.G. 'G' prepayment mechanism is accepted as the most modern precision movement on the market.

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Gas Journal

VOLUME 296. No. 4973 NOVEMBER 5, 1958. 110th YEAR

The Next 20 Years

AS in previous years, the Institute of Fuel organised a series of technical meetings in connection with the Industrial Fuel Efficiency Exhibition recently held at Olympia, taking as their general theme 'lower costs and high production through better fuel utilisation.' Papers were presented by experts in the various fields of fuel utilisation. With the rise in industrial activity throughout the world since the war, the question of fuel availability is becoming of ever-increasing importance. As living standards rise and the cost of the extraction of fossil fuels increases, so does the proportion of fuel costs in the total costs of production of almost every class of goods. To remain competitive individual fuel industries, too, must be able to reduce their costs of refined fuel production. To be in a position to do this they must have some idea of the availability of indigenous raw materials—in their case, fossil fuels.

Among the papers presented was one by Dr. A. Parker entitled 'Britain's Fuel and Energy Needs: The Next Ten to Twenty Years,' which we are publishing this week. Dr. Parker points out that the latest estimated reserves of coal in Great Britain in seams not less than 1 ft. in thickness and not greater than 4,000 ft. from the surface are about 17,000 mill. tons, of which not more than about 50,000 mill. tons are likely to be mined economically. This estimate would allow an output of coal at 250 mill. tons annually for 200 years. Since the more easily mined coal will be extracted first, the cost of coal at the pithead will eventually increase, but provided that stable conditions of manpower and wages can be assured, no great price increases are likely over the next 20 years. Other indigenous fossil fuels, such as peat, oil shale, petroleum and natural gas are unlikely to have any great effect on our fuel resources in the period under review.

Certain other sources of 'energy income,' such as hydro-electric generation from non-tidal water power may increase from its present coal equivalent of 1 mill. tons to 2 mill. tons in the next 20 years, but the development of tidal power and solar energy on a substantial scale are not yet in sight under the prevailing conditions in Great Britain; nor are any developments likely in methane production from sewage, wood waste as a fuel or the mining of indigenous uranium ores. Coal is, therefore, likely to remain our most important source of energy. Even so the production of coal over the last year or so has remained constant at about 225 mill. tons a year. The development of mechanised mining has been largely responsible for the increase since 1947, but with a large preponderance of small coal which is fast becoming a source of embarrasssment to the National Coal Board.

The production of electricity has increased by 105% and of gas by 25% since 1947, but the consumption of coal by these industries has only increased by 72% and 13% respectively because of increased efficiency, and in the latter industry also because of the increase in purchases of gas from the coking industry. In the iron and steel industries the demand for coke has risen considerably and coal carbonised in coke ovens by more than 50%, from 19.8 mill. tons to 30.7 mill. tons. If industrial activity demands it, plans for expansion in the iron and steel industries are likely to be implemented over the next 20 years with a steep rise in coal consumption, though greater fuel efficiency is likely to reduce somewhat the present rate of increase.

Other authorities have calculated that by 1980 the fuel demands in Great Britain calculated as coal equivalent will have reached 367 mill. tons. Dr. Parker, however, is more conservative and does not think it will be more than 275-280 mill. tons, since he is of the opinion that the very steep rise since 1947 will fall off considerably within the next ten years. Assuming that the higher figure has to be reckoned with, and that the coal output in this country rises to 240 mill. tons, a formidable gap in indigenous fuel supplies must be faced. When all the nuclear energy plants now under development are completed power from this source up to a maximum of 90 mill. tons of coal equivalent is forecast for 1980, so that a gap of about 35 mill. tons coal equivalent still remains to be filled by fuel imports of which oil will form a large percentage.

What part is gas likely to be able to play in the future supply of energy to industry and the home? We can confidently say that it should be able to play a very important part, provided it can be produced competitively from any available raw material. We

have said on more than one occasion that the gas industry is more developed in Great Britain than in any country in Western Europe as shown by gas consumption per head of population. In America, the discovery of natural gas has made possible an enormous expansion in its use in the home, and its appearance in Europe shows signs of a great development in its industrial uses.

We think that, given similar opportunities, Great Britain would be able to expand its consumption of gas but is the period of 20 years too short a time to see the full fruition of the research work now being carried out by the Gas Council? A sulphur-free gas produced from the cheapest raw material would undoubtedly appeal to all potential consumers and at the same time more efficiently make full use of raw fuels available. It cannot make the import of oil unnecessary but it can contribute towards making those imports as small as possible. The present tendency towards using all possible sources of gas, the greater interest in a national grid, and the present developments in plant design should go a long way toward cutting out the burning of crude fuels.

From Greenwich to Stevenage

THIS autumn sees the beginning of the move of the Fuel Research Station from Greenwich, where it has been since its foundation in 1917, to the new Warren Spring laboratories at Stevenage. The move, which should be completed by the spring of next year, was the result of the decision that further money spent on the building at Greenwich would not be economic. The Fuel Research Board is taking this opportunity to reappraise the future programme of its activities and has made the somewhat significant decision to concentrate on two lines of research only, namely, work concerned with the measurement and abatement of air pollution, and with the synthesis of oil from coal. At first sight it might seem strange that after the very full programme of research undertaken by the Board in the past, its future activities should be confined in this way. It is, however, we think, a clear outcome of the way fuel research has been developing in the past few years. When the Board was founded in 1917, it was to undertake research into fuel problems in all their branches but latterly many other bodies interested in some special line of fuel production or utilisation have been set up to carry out researches which in many cases may be actually duplicating work being done at Greenwich. Such bodies are the Gas Council, the National Coal Board, the British Coal Utilisation Research Association and others.

The research departments of these bodies are supported either by the industry they represent or by industries interested in the work they are doing. It is clear that the two lines of research to be carried out by the new station, though of the utmost importance to the country as a whole, are not yet of sufficient practical interest to individual industries to cause them to be included in their research programmes. Such a task is better carried out by a Government-sponsored body to ensure that every assistance is given to all fuel users in conforming to the Clean Air Act and to the long-term fundamental research connected with the nation's fuel resources. Further than this, the Board is considering what other fields of research falling broadly into this latter category the new station might usefully carry out which would not be normally included in the programmes of the other bodies.

The report of the Board—Fuel Research, 1957—published recently, outlines the future programme and gives an account of work carried out during the year under review. It points out that the new laboratory will become the centre of research on air pollution and will continue the co-operative scheme for the measurement of pollution and the collection and analysis of all data. The importance of fundamental research on the processes for the conversion of oil from coal, the report shows, is emphasised by the country's growing dependance on imported oil from abroad, while at the same time the raw materials on which the processes will depend are likely to become more plentiful. A few years ago it seemed that the necessary coal would not be available, but with the rapidly developing use of nuclear energy, it now seems possible that there will be a surplus of the low-grade coal of the kind now being consumed in power stations.

New work undertaken during the year included work on a small portable instrument which can be used in place of the Ringelmann Chart. It consists of a small telescope containing a number of translucent screens, darkened to standard shades, with which the smoke can be compared. In one model two screens corresponding to Ringelmann shades No. 2 and No. 3 are arranged so as to appear one above the other in half the field of view, the image of the smoke being seen directly in the other half. Consistent readings have been obtained by different observers. It is convenient to use and its accuracy is at least as great as that of the Ringelmann Chart.

There has been a certain reluctance in the past among householders to install coke burning fires because it was felt that should the chimney become blocked, the room would be filled with dangerous fumes without the occupant being aware of it. To investigate this possibility the Research Station have carried out tests, using a coke containing 1.4% of sulphur, in a grate with a blocked chimney. The tests showed that after 35 minutes the room became uninhabitable because of sulphur dioxide fumes, whereas the carbon monoxide concentration was still less than 100 p.p.m., a concentration which a person in normal health can breath for some time without harm. Work continues on the changes which take place in residual fuel oils in storage, the combustion of coal in boilers and furnaces, and the gasification of coal and coke in gas producers, which includes investigations on the working of the slagging producer.

It will be noticed that all such investigations are similar to those being carried out in other fuel research laboratories so that the decision of the Board to discontinue them at its new laboratory at Stevenage seems justified. The importance of fundamental work carried out in the past and its influence on modern combustion and gasification processes cannot be stressed too strongly but we think that in its long-term policy to concentrate on technological research in the important field of oil production from coal, the Board is making an important move forward.

Personal Notes

MR. J. SEMPLE has been appointed Managing Director, MR. G. A. GREENWELL Technical Director, and MR. L. A. READ Works Director of Metal Porcelains Ltd. Mr. Semple joined M.P.L. in 1955 as Sales Manager, after ten years' service with Radiation Ltd., where he became production and service manager of the frit plant. In 1956 he was appointed General Manager of M.P.L. Mr. Greenwell worked for 15 years as a glass technologist at Chance Bros., and after seven years as development chemist at Radiation Ltd., was appointed to a similar post at M.P.L. in 1955, becoming Technical Manager in 1956. Mr. L. Read joined M.P.L. on its formation in 1945 holding positions in the laboratory and the works. In 1949 he was appointed Production Manager, becoming Works Manager in 1956.

DR. D. T. A. TOWNEND, C.B.E., Director General of the British Coal Utilisation Research Association and Past President of the Institute of Fuel, was the first British recipient of the Gold Medal of the Institut Francais des Combustibles et de l'Energie, at a ceremony held in Paris on October 21. The medal, which is designed to recognise outstanding scientific achievement in the field of utilisation of fuel and power, was presented by M. Ramonet, Minister of Industry and Trade, and the citation upon Dr. Townend's achievements was delivered by M. Cheradame, Technical Director General of the Centre d'Etudes et Recherches des Charbonnages de France.

MR. F. B. KERR, District Manager, Johnstone, where the works have now been closed down, has been appointed District Manager of the combined Paisley and Johnstone districts of the Scottish Gas Board. MR. D. E. MOORE, until now District Manager of the Paisley district, has been appointed Divisional Commercial Gas Sales Officer for the Glasgow and Western Division.

MR. F. T. FRETWELL, who has spent 32 years in the gas industry, retired from his post of Accounting Officer in charge of the Chesterfield office of the East Midlands Gas Board office on October 31.

DAME VERA LAUGHTON MATHEWS, D.B.E., has accepted an invitation from the Minister of Labour to serve on the Women's Consultative Committee which advises him on questions of employment policy relating to women.

Diary

November 8. — SCOTTISH WESTERN JUNIORS AND EAST OF SCOTLAND JUNIORS: High Street, Falkirk. Joint Meeting, including an address by Mr. W. E. Dobson, of the West Midlands Board, on his experiences at the summer school of the Institute of Gas Technology, Chicago. 3 p.m.

November 10. — YORKSHIRE SECTION, ROYAL INSTITUTE OF CHEMISTRY: University of Leeds. Annual General Meeting. 6.30 p.m.

November 14.—I.G.E. SESSION OF THE PUBLIC WORKS AND MUNICIPAL SERVICES CONGRESS: Olympia, London. 'Heat Services by Gas in the Modern Dwelling,' by F. J. Eaton and E. S. Harris, and 'Tar Roads for Modern Traffic,' by J. R. Dewhurst. 2.30 p.m.

November 18-19.—INSTITUTION OF GAS ENGINEERS: Church House, Westminster, S.W.1. Autumn Research Meeting.

November 19.—COMBUSTION ENGINEERING ASSOCIATION, WESTERN REGION: Park Hotel, Cardiff. Meeting, including paper on 'Smoke Abatement,' by J. Lawrence. 10.30 a.m.

November 19.—INCORPORATED PLANT ENGINEERS, DUNDEE BRANCH: Visit to Dundee Gasworks.

Obituary

MR. R. PATTISON CARR, who had worked in the gas industry for more than 50 years, died on October 30, aged 66. Mr. Carr began work in 1906 in the works office of Fylands gasworks, and later became secretary of Bishop Auckland District Gas Company. He was appointed commercial assistant at the Bishop Auckland office of the Northern Gas Board when the industry was nationalised, and retired at the beginning of this year.

MR. J. C. W. BOOTH, of Henry Balfour & Co., Ltd., was among the victims of the recent air crash at Anzio, Italy; he was on a business trip to Rome. Mr. Booth, who was aged 39, had previously been employed by the East Midlands Gas Board at Rotherham.

FLUEING METHODS EXHIBITED AT BRIGHTON SHOW

THE most up-to-date flueing methods and gas appliances were shown to best advantage on the Gas Council stand at the recent National Housing and Town Planning Exhibition at Brighton. Three 'mock-up' sections of buildings were on the stand. The sections, about 10 ft. high, were cut-away to show how systems and appliances are installed and how they work.

The Se-Duct branch and 'X' block flue systems were included in the show. Manufacturers whose equipment was displayed included Wm. Sugg & Co., Ltd.; Ascot Gas Water Heaters, Ltd.; Radiation Group Sales, Ltd.; Wm. Sugg & Co., Ltd.; Newton Chambers & Co., Ltd.; Allied Ironfounders, Ltd.; R. & A. Main Ltd.; and Bratt Colbran, Ltd.

MIDLAND JUNIORS VISIT MOTOR BODY BUILDING WORKS

SOME 30 members of the Midland Junior Gas Association, with their President, Mr. G. W. F. Cockayne, visited the works of Fisher & Ludlow, Ltd., Birmingham. The motor car body section was visited and members saw the pattern shop, toolroom, press shop, body building sections, roto dip, paint shop and the trim and punching departments.

The Fisher & Ludlow organisation dates back to 1849 when Mr. Fisher began manufacturing and selling tinman's furniture in a little shop in Birmingham.

Following the 1914-18 war the firm of Fisher & Ludlow (1920), Ltd., was formed and entered the motor industry. Today it employs 9,500 people using 2,000 tons of steel per week and consumes 150 mill. cu.ft. of gas per annum.

Coke Workers Quit

Five hundred men employed at Derwenthaugh coke works, Blaydon (Co. Durham), have tendered 14 days' notice terminating their employment as a result of a dispute with the Coal Board over the working of a 42-hour week. A number of coke works in Durham are working 42 hours based on a five-day week, but at Derwenthaugh, Monkton, Norwood, and Stella Gill plants, a 42-hour week based on 5½ days is still in operation and the employees are asking for a five-day week. It is expected that men at Monkton, Norwood, and Stella Gill plants will support the Derwenthaugh men in any strike action.

DR. BADGER TALKS TO W.G.F. ABOUT CAREERS IN GAS

'CAREERS and Opportunities in the Gas Industry' was the subject chosen by Dr. A. B. Badger, Industrial Relations Officer to the Gas Council, for his address to the headquarters branch of the Women's Gas Federation in London recently.

Dr. Badger stressed the importance for young people to give a great deal of thought to the choice of their career. They should be encouraged to take very opportunity to find out what different kinds of work involve. This was why the gas industry ran its short works courses and welcomed school visits.

He spoke of the wide variety of opportunities the gas industry offered to young men and women in the scientific, engineering, administrative, clerical and sales fields.

During the discussion which followed, Dr. Badger was asked what the gas industry could do about the 300,000 young people who would be leaving school and looking for jobs in the next five or six years. He said the Gas Council would absorb as many as possible.

ADDRESS TO SCOTTISH WESTERN JUNIORS

Glasgow Division's gasfitting reorganised

DETAILS of the reorganisation recently carried out in the gasfitting department of the Glasgow Division of the Scottish Gas Board were given by Mr. Andrew Mitchell, Glasgow, when he addressed members of the Scottish Western Junior Gas Association in Glasgow recently.

It was not yet possible, he said, to assess the full benefits to be expected from the scheme, but 'an increase in output of even one job per man per day for, say, 200 of the fitters could effect a saving each year of well over £20,000.'

This was being brought about by a complete reorganisation. Formerly about 300 men were controlled and sent out each morning from one centre of limited accommodation to districts as far as nine miles away, using public transport and against the traffic of the city at peak hours. Now the staff operated from five dispersal centres strategically placed in the Glasgow area (the last was opened only a few weeks ago), with mobile workshops equipped with radio-telephone on call, and with a reorganised consumers' service bureau in the background.

Statistical Background

Mr. Mitchell remarked that the reorganisation had to be planned against the background of Glasgow's statistics—360,000 gas consumers, 1,737 miles of main of varying sizes in over 6,000 streets, and a sale of gas last year of 14,011 mill. cu.ft. with a maximum day of 61 mill. cu.ft.

Plans were evolved for the dispersal of the fitters and it was decided to divide the city into five zones. It was possible to utilise existing Board property to set up a centre of similar pattern in each zone. 'To effect the dispersal, it was necessary to carry out lengthy negotiations with the Unions concerned. From the commencement, the management's proposals received their full support and co-operation. They greatly assisted in effecting a smooth change-over in what was a major operation and put forward helpful suggestions which were adopted and are valuable contributions to the efficient working of the reorganised set-up.'

Mobile Workshops

Mobile workshops were also planned to cover outlying areas. Three were already in operation and six others under construction. Each workshop had accommodation for 12 fitters, plus two or three apprentices and helpers, and in addition to carrying stores material was equipped with radio telephone system.

Over the year of reorganisation, the gasfitting strength had been built up by the acquisition of plumbers to 300 gasfitters, with about 60 apprentices and 50 helpers. It was anticipated that the gasfitting strength would be kept up to about 300, and fluctuations in requirements for installation of equipment would be met by regulating the allocation of work to plumbing contractors. 'At the present sudden peak demand for appliances, occasioned by the relaxation in the deposit restriction on hire purchase sales and by a concentrated sales effort, it has been found necessary to allocate much of the appliance installation work to these outside firms.' There were 130 plumbing contractor firms on the approved list. With the dispersal of the fitters, the maintenance and gasfitting sections had been merged and each depôt carried out all the types of work within its own area.

The use of standard kits had been introduced. Material now used on each job was returned to stores. In the case of plumbing contractors, a van was being assigned to call at their workshops once a month to uplift returned kit bags with the surplus pipe and fittings.

WAGE INCREASE

Agreement has been reached between the Gas Council and the Confederation of Shipbuilding and Engineering Unions providing for an increase of 2½d. per hour in the standard rates of pay of Engineering Maintenance Craftsmen employed in the gas industry. This increase takes effect as from 6 a.m. on Sunday August 31 of this year.

Referring to the new consumers' service bureau, Mr. Mitchell said that prior to the reorganisation the Complaints Department was in the head office in George Square, the Job Control was operated from the gasfitting department in Walls Street, about half a mile away, and stores were issued from Milan Street, about two miles away. There was an excessive time lag between receipt of an order and the installation of the appliance. Telephone facilities, both at head office and Walls Street, were totally inadequate for the volume of traffic and the whole system was ponderous.

The new Consumers' Service Bureau was designed to deal with all complaints and enquiries made and to control the execution of all gasfitting work in the area of supply. A telephone enquiry bureau received all telephone communications from consumers, disposed of these by direct action or where work was being initiated passed the information to a sorting department, to which queries and demands from all sources were directed, the jobs then being passed over to the job planning section. From there, the cards were sent out to the gasfitters or contractors for attention, the progress of the job being dealt with in the records section, the administrative section dealing with requisitioning and the other functions including wages, statistics, petty cash disbursements, etc.

In a reference to the separate meter fitters' section, Mr. Mitchell said that formerly meter defects were attended to by a meter mechanic section, who reported to the gasfitting section when a meter required to be exchanged. Following delivery of the new meter, the gasfitters carried out the necessary work and the exchanged meters were uplifted by transport. Thus such meter exchanges necessitated normally four calls at the consumer's premises. The newly-organised meter fitters' section was designed to effect such exchanges in one operation. The meter fitter was mobile and carried with him a stock of meters. He disconnected the old meter, fitted the new meter, completed the necessary records, and, in the case of prepayment meters, carried out on the premises the money transaction.

A gasfitting training centre, concluded Mr. Mitchell, was set up in Walls Street some six months ago, and already instruction had been given to over 526 employees—gasfitters, apprentice gasfitters, mains and service personnel, meter mechanics, salesmen, and other sales staff. Basic and refresher courses were planned to cover all aspects of the work.

Manchester Section visits Hopkinsons

A visit to the Britannia Works of Hopkinsons Ltd., Huddersfield, on October 24, enabled members of the Manchester Section of the I.G.E. to see many processes in the manufacture of valves and mountings. More than 2,000 employees are engaged in the production of valves and related products, such as electric valve controls, desuperheaters, soot blowers, pump leak-off equipment, etc.

The tour of the factory commenced at the new Birkby Lodge Works which is entirely devoted to the completion and assembly of forged steel valves in sizes up to 1½ in. bore. The visitors next visited the centrifugal separator and soot blower departments and the west machine shop, proceeding by way of the steel foundry with its two electric furnaces, 'Hydroblast' equipment, X-ray department, etc., to the main machine shops and assembly department, adjoining which are the hydraulic test bay and steam test house. After inspecting the production of motorised valves, control cubicles and other types of automatic equipment, the visitors saw a display of Hopkinsons' principal products in the entrance hall, and finally visited the new Blacker Road works where the 60-in. 'Tansphere' valves for CO_2 control in atomic power stations are constructed.

Another port of call was the new Huddersfield showroom of the North Eastern Gas Board.

U.S. discovery may simplify natural gas importation

THE experimental development of a chemical substitute for petrol announced by Professor Ernest Starkman of the University of California was discussed last week by the scientific correspondent of the *Financial Times*. It was stated that the results of Professor Starkman's experiments so far as they were available indicated that the processes used could relatively easily be adapted for large-scale commercial production providing that development work did not introduce unforeseen complications.

'The development is important because it offers the possibility of the industrial production of a petrol-like fuel from a new raw material, which will operate more simply and, therefore, possibly more economically than conventional petrol. If and when the new material is developed commercially it will not, however, replace oil as a source of fuel for transport purposes. For one thing, the basic raw material used for its production is natural gas, much of which is inevitably extracted in conjunction with oil. Moreover, the material has so far only been produced in very small quantities on an experimental scale, and its commercial exploitation must lie many years ahead.

'The future development of the Starkman process would mean that countries such as Italy which possessed natural gas, but little oil reserves, could produce petrol or diesel engine fuel relatively cheaply. It would also mean that natural gas could be exported from countries such as Canada and the Middle East in a form which would be economic.

The *Financial Times* pointed out that the U.S. could usefully export natural gas and that the Starkman and Commercial Solvents process for converting this natural gas into an easily exportable form which was in world-wide demand, was, therefore, of considerable potential economic significance.

Board Chairman addresses Eastern G.C.C.

AT a recent meeting of the Eastern Gas Consultative Council with Councillor Lt.-Col. R. I. Musson in the Chair, the Chairman of the Eastern Gas Board, Sir John Stephenson, C.B.E., addressed the Council on the Board's Ninth annual report.

In welcoming Sir John and officers of the Board, the Chairman of the Council said the Board was doing a great job and its service continued to be maintained at a uniformly high standard.

Concluding his address, Sir John said that it was the last occasion on which he would come as Chairman of the Board and give a review of the year's results. His term of office would end next May.

He had from the beginning endeavoured to imbue the Board's staff with the idea that the Eastern Gas Board was created to give a service. He thought they had given that service, and one of the greatest helps that he had had since 1949 had been the sure knowledge that the Council had appreciated that they too, in a different sense, were also there to serve the same customers as the Board.

They had not always agreed and he had appreciated very often the constructive criticism and suggestions which had come from the Council's deliberations. What they had done, had been done together, with a common aim.

EASIER TERMS IN THE NORTH WEST

FOLLOWING the removal of hire purchase controls by the Government the North Western Gas Board announced that as from October 29, gas fires, coke grates, refrigerators, gas-heated power-operated washing machines and all other gas and coke appliances with a cash value of more than £7 10s. 0d. could now be bought over five years, with a down payment of only one-twentieth (as against one third) of the total price. Previously they have been obtainable only on two-year hire purchase terms, on nine-month credit terms or for cash.

Appliances valued from £2 10s. up to £7 10s., such as small portable gas heaters and hall radiators, will be obtainable on three-year hire purchase terms, with a down payment of one-twelfth of the total price. Previously they were obtainable on two-year hire purchase terms with a down payment of one third of the total price. Appliances which cost less than £2 10s., such as gas pokers and pistol lighters, will be sold only for cash or on nine-month credit terms.

'Without the Prince'

The Gas Council Dramatic Society's latest production, 'Without the Prince,' will be presented at the Rudolf Steiner Theatre on the evening of Tuesday, November 18. It is a country comedy. The date may be of interest to those attending the Autumn Research Meeting of the Institution of Gas Engineers, who will be in London at the time. Tickets may be obtained from Miss Jill Bolton, the Gas Council, 1, Grosvenor Place, London, S.W.1, or from any member of the dramatic society.

Yorkshire Juniors hold annual meeting in Leeds

AT the annual general meeting of the Yorkshire Junior Gas Association held in the N.E.G.B. headquarters in Leeds, recently, Mr. R. E. White, Works Manager of the Board's Tingley works, was elected President of the Association for the new session, succeeding Mr. E. S. Carter, of Huddersfield. The new Senior Vice-President is Mr. E. C. Williams, of Doncaster, and the new Junior Vice-President, Mr. J. Edgar, of Todmorden.

The highlight of the meeting was the presentation of the Clayton Gold Medal and the Society of British Gas Industries' Medal to Mr. P. C. Egan, formerly of head office, Leeds; the Clapham Silver Medal to Mr. J. A. Whitworth, of Hull; and the Firth Prize to Mr. K. O. M. Golisti, head office, Leeds.

There was an address by Mr. N. G. Appleyard, Group General Manager, Leeds Group, who made a plea for young men to study with a view to availing themselves of opportunities offered in the present age of specialisation.

Other points which Mr. Appleyard made included the importance of the study of safety, industrial relations, and information contained in the industry's 'wonderful' technical Press.

A vote of thanks to Mr. Appleyard was moved by Mr. E. C. Williams; and Mr. J. Edgar, of Todmorden, moved a vote of thanks to Dr. R. S. Edwards, Chairman, North Eastern Gas Board, for facilities provided.

MIDLAND JUNIORS HOLD SEASON'S FIRST MEETING

THE opening meeting of the 1958-59 session of the Midland Junior Gas Association was held recently, with Mr. D. J. O. Bath in the Chair.

New members elected included Mr. P. J. Newman, Stratford-upon-Avon; Mr. A. Hopkins, William Press and Son, Ltd.; Mr. J. Graham, Dudley; Mr. D. T. L. Watts, Wellingborough; Mr. R. T. Dell, Walsall; Mr. A. W. Kidman, West Midlands Gas Board Headquarters; Mr. D. W. Hemfrey, Birmingham; Mr. A. T. Corbett, Smethwick; Mr. W. R. Banting, Smethwick; and Mr. D. E. MacKenzie, Dudley. Mr. W. H. Bacon and Mr. G. Brittle, Walsall, were re-elected after serving in the Forces.

The President thanked members for their support during his period of office, and introduced Mr. G. W. F. Cockayne, Divisional Distributing Engineer, No. 2 Division, West Midlands Gas Board, as his successor.

After Mr. Cockayne had read his presidential address, a vote of thanks to Mr. Cockayne was proposed by Mr. Stanley Jones, Divisional General Manager, No. 2 Division, West Midlands Gas Board.

From a paper read at the meetings held under the auspices of the Institute of Fuel at the Industrial Fuel Efficiency Exhibition, Olympia, 1958.

Britain's Fuel and Energy Needs: The Next Ten to Twenty Years

By A. PARKER, C.B.E., D.Sc.

IN attempting to forecast the probable changes in the available supplies of the main types of fuel and energy and in the demand for them over the next ten to 20 years, it is first necessary to study the changes that have occurred in the recent past and their causes, and then to endeavour to assess to what extent changes are likely to occur in the future. This is not an easy task with the rapid developments that often result from the application of the discoveries of research in science and technology, and with the uncertain fluctuations in trade and commerce and in the labour situation both at home and overseas. One important assumption must be made, and that is that international political differences and ambitions do not lead to wars or to restrictions in trade in any part of the world of such magnitude as seriously to upset the reasonable flow of commodities and manufactured goods.

Increasing Demand

Forecasts of the fuel and energy situation over various periods of time have been attempted in a number of books and papers published during the last ten years. They have all agreed that in this country and in the world as a whole the total demand for fuel and energy will increase, with changes in the relative importance of the different primary and secondary forms of energy; but they have differed in the estimates of the rates of increase and the rates of change in the relative amounts of the several forms of energy.

It has been estimated that the total reserve of bituminous coals and anthracites in the United Kingdom is about 170,000 mill. tons in seams of not less than 1 ft. in thickness and at depths not greater than 4,000 ft. from the surface. Of this quantity probably not more than about 50,000 mill. tons could be brought to the surface economically with present techniques of mining. Even so, there is sufficient economically mineable coal for 200 years at an average rate of production of 250 mill. tons of coal a year. As the more easily accessible seams of coal of the better qualities will be mined first, the difficulties and costs of mining will gradually increase, unless new and less costly methods of mining can be developed. There should be no measurable increase, however, in the difficulties and relative costs of mining coal within the next 20 years, subject to the important proviso that suitable technical staff and labour can be found and persuaded to do good work without constant demands for higher and higher wage rates in relation to productivity and the expenditure on mechanisation.

Experiments on the underground gasification of coal have been in progress over many years in several countries, including this country, and are being continued; but it is very unlikely that underground gasification will have any appreciable effect on the fuel situation within the next 20 years.

Known resources in the United Kingdom of the other fossil fuels, peat, oil shale, petroleum and natural gas are very small in comparison with the coal resources. The reserves of peat are probably equivalent to not much more than 500 mill. tons of bituminous coal. Work is in progress on methods of harvesting, drying and utilising peat, but it is highly improbable that there will be the economic production of a substantial quantity of peat for use as fuel within the period under consideration. Total resources of oil shale are estimated to yield no more than about 20 mill. tons of oil; present production is in the region of only 75,000 tons a year and it would not be economic to install new plant at current capital costs substantially to increase production. Intensive exploration for petroleum oil and natural gas has so far led to the discovery of only about 1 mill. tons of oil and no great quantity of natural gas. Indigenous production of petroleum oil is only about 60,000 tons a year. Some gas from coal measures is being collected and used, but the amount is unlikely to reach the equivalent of 1 mill. tons of coal a year within the next 20 years.

'Energy Income'

With regard to what might be called 'energy income,' the amount of electricity being produced from non-tidal water power is roughly equivalent to that obtained from burning 1 mill. tons of coal a year at a thermal power station. This quantity may be doubled in the next 20 years. The economic harnessing and utilisation of tidal power, wind power and solar energy on a substantial scale are not yet in sight under conditions in the United Kingdom. Methane gas equal in thermal value to that of about 25,000 tons of coal a year is produced from the fermentation of sewage sludge to provide power at sewage treatment works; this quantity may be increased in the period being considered by 25 to 50%. Small quantities of wood and other waste materials are also used as fuel for various purposes, but the total quantity is not of importance in relation to overall fuel needs and is not likely to be increased.

Surveys of uranium ores are in progress but no large reserves of indigenous ores sufficiently rich in uranium to be economically recoverable have so far been found.

It is thus clear that coal will remain by far the most important indigenous source of fuel and power, and

that within the next ten to 20 years other indigenous sources, including hydro-electric power, will not be equivalent to more than 3 or 3½ mill. tons of coal a year.

In Table 1 figures are given for the indigenous production of coal, oil and hydro-electricity, in equivalents of millions of tons of coal per annum, for the years 1947 to 1956. The figures for the coal equivalents of oil have been obtained on the basis that 1 ton of oil is equivalent to 1.7 tons of coal, and those for hydro-electricity have been calculated from the efficiency of thermal power stations. The data for annual production of coal include fluctuating amounts of opencast coal in the range 10.1 to 12.4 mill. tons a year.

Table 1 shows that the annual output of coal was increased from 197 mill. tons in 1947 to 226 mill. tons in 1952. Since 1952, and including 1957 when the amount produced was between 223 and 224 mill. tons, the annual output has been fairly steady in the range 222 mill. to 224 mill. tons a year. These figures, and consideration of the factors affecting the British coal

TABLE 1.—INDIGENOUS PRODUCTION OF COAL, OIL AND HYDRO-ELECTRICITY FOR THE YEARS 1947 TO 1956
(MILLION TONS OF COAL EQUIVALENT).

Year	Coal	Oil	Hydro-electricity	Total
1947.. ..	197·3	·24	·7	198·2
1948.. ..	209·2	·25	·9	210·3
1949.. ..	214·9	·27	·8	216·0
1950.. ..	216·0	·27	·9	217·2
1951.. ..	223·2	·25	1·0	224·4
1952.. ..	226·5	·27	1·0	227·8
1953.. ..	224·2	·27	1·0	225·5
1954.. ..	224·3	·27	1·3	255·9
1955.. ..	222·1	·25	1·0	223·3
1956.. ..	222·4	·24	1·2	223·8

industry, suggest that there is not likely to be any substantial increase in coal production within the next ten years or possibly longer. Unless some new oil resources are discovered, the rate of production of indigenous natural oil will not be increased. As already mentioned, the generation of electricity from non-tidal water power may rise to the equivalent of about 2 mill. tons of coal a year. It thus seems probable that the total coal equivalent of the annual production of coal, oil and hydro-electricity within the United Kingdom will remain between 220 and 230 mill. tons over the next ten and possibly 20 years.

In Table 2, figures are given for the home consumption of coal, classified according to the main groups of consumers, and for imports and exports for alternate years from 1947 to 1957.

These figures, together with several factors likely to be operative in the near future, have been considered in attempting to forecast the probable changes in the demand for coal during the next ten to 20 years. One important factor is that during the last few years, with increased mechanisation in coal mining, the proportion of small coal produced has increased and the proportion of large coal has declined. In consequence, the supply of small coal now exceeds the demand and the demand for large coal exceeds the supply. In 1957, the 2.9 mill. tons of coal imported was mainly large coal at an average import cost of £8 15s. per ton as compared with an average cost of production of £4 1s. 6d. per ton of coal raised in this country. Efforts are being made to increase the proportion of large coal as mined and to increase the quantity of coal that is briquetted, but it is uncertain whether these moves will have a substantial effect over the next ten years.

Other important factors are the continuously rising cost of coal production, which was twice as great in 1957 as in 1947; the easier control, greater convenience and saving of labour in the use of electricity, gas and oil, the prices of which have not risen proportionately so rapidly as that of coal; and the determination to reduce the pollution of the air by smoke and grit and dust with the coming into operation of the Clean Air Act, 1956.

TABLE 2.—HOME CONSUMPTION AND IMPORTS AND EXPORTS OF COAL IN ALTERNATE YEARS FROM 1947 TO 1957
(MILLIONS OF TONS PER ANNUM)

	1947	1949	1951	1953	1955	1957
Home Consumption :						
Electricity works	27·1	30·0	35·4	36·7	42·9	46·5
Gas works	22·7	25·3	27·4	27·2	28·0	26·4
Coke ovens	19·8	22·6	23·5	25·9	27·1	30·7
Railways	14·6	14·4	14·2	13·4	12·2	11·4
Collieries	11·1	10·8	10·6	9·9	8·6	7·2
Industry	35·8	38·4	41·0	39·6	40·8	37·5
Domestic	31·6	31·0	31·9	32·0	31·9	30·0
Miners' coal	5·0	5·0	5·3	5·2	5·1	5·1
Coastwise bunkers ..	1·0	·9	·9	·8	·6	5·
Miscellaneous	13·1	14·7	15·1	15·2	15·5	15·2
Total (Great Britain) ..	181·8	193·1	205·3	205·9	212·7	210·5
To N. Ireland and Channel Islands	2·7	2·7	3·0	2·9	3·0	3·0
Imported coal	·7	—	1·2	·6	11·5	2·9
Exports and foreign bunkers	5·3	19·2	11·5	16·7	14·0	7·8

From 1947 to 1956 the sales of electricity rose by 105%, but owing to improvements in the efficiency of generation the coal equivalent of the coal, coke, oil and water power used increased by only 72% from 28.1 mill. tons to 48.4 mill. tons per annum. The coal equivalents of the oil used were .8 mill. tons in 1947 and .63 mill. tons in 1956 and the corresponding figures for hydro-electricity were .7 and 1.2 mill. tons. If the increases in the demand for electricity and in the efficiency of generation continue, as seems probable, there will be required for the power stations ten years hence a quantity of fuel and energy equivalent to about 80 mill. tons of coal a year. The electricity derived from water power may be equivalent to 2 mill. tons. With uncertain changes in policy, it is difficult to suggest how much fuel oil will be used by power stations, but for the purpose of this forecast it is assumed that it will be equivalent to about 5 mill. tons of coal a year. This would leave a coal equivalent of 73 mill. tons a year to be provided by coal, coke and nuclear energy. According to plans for the construction of large nuclear power stations, the first of which should begin operation in 1960-61, it seems probable that ten years hence one-fifth of the electricity generated, or the equivalent of 16 mill. tons of coal a year, will be from nuclear stations. This would leave the demand for coal for power stations at 57 mill. tons a year or about 11 mill. tons greater than in 1957; and it should be noted that power stations can use small coal without difficulty.

Sales of gas by the gas industry rose by rather more than 20% over the period 1947 to 1954, with no appreciable change during the last three years. In 1947, 12% of the gas was bought from coke ovens

and in 1957 the proportion was 16%. The coal equivalent of the coal and oil used at the gas works for making gas and coke rose from 23.8 to 27 mill. tons a year from 1947 to 1956, or by only 13%, largely because of increased efficiency and partly from an increase in the quantity of gas bought from coke ovens. Periodic rises in the price of gas making coal have stimulated the gas industry in the development and installation of plant for the complete gasification of coals of a wider variety and for the gasification of oil; they have also encouraged the purchase of surplus gas from coke ovens and oil refineries, explorations for natural gas, and investigations of the practicability of importing surplus natural gas from overseas. These activities will probably lead within the next ten years or so to a reduction in the quantity of coal required by the gas industry of perhaps 3 or 4 mill. tons a year.

Though efficiency in the use of coke in the iron and steel industry has increased during recent years and is still increasing, the industry has so greatly expanded that the coal used by coke ovens has risen by more than 50% from 19.8 mill. tons a year in 1947 to 30.7 mill. tons in 1957. There are plans for a considerable further expansion in the production of iron and steel, but how far these plans will be implemented will depend on general industrial activity. Taking various factors into account, it seems probable that there will be fluctuations over the next one or two decades with an average demand for coal for coke ovens at about the present level in the region of 30 mill. tons a year.

With developments in the electrification of the railways and the greater use of diesel locomotives, there will certainly be a reduction in the use of coal by the railways, probably by about 3 mill. tons a year over the next ten or 15 years. There will also be a reduction in the quantity of coal used at the collieries, maybe by about 2 mill. tons a year, with more electricity taken from the grid.

Though the population and the numbers of separate households are increasing, the amount of coal used direct for domestic heating is not likely to increase; it may decrease to some extent with an appreciable increase in the use of electricity and oil. The miners will presumably continue to receive about 5 mill. tons of coal a year.

Decrease Expected

During the last ten years there has been no marked change in the amounts of coal entered in Table 2 against the items 'industry' and 'miscellaneous.' With the rising costs of labour and the desire for better control and greater convenience, the probability is that there will be some decline in the use of raw coal under these items with an expansion in the use of electricity, oil and gas. As a guess, the reduction in the direct use of coal might be put at 3 mill. tons a year.

Since 1948 there has been a continuous decrease in the amount of coal taken by coastwise and foreign bunkers from a total of more than 6 mill. tons a year to only about 2 mill. tons in 1957. 'With the continuing change over to oil, there is likely to be a further decrease of at least 1 mill. tons a year over the next ten years.

Summarising the statements made and opinions expressed so far in this section, it may be concluded that there will be little change over the next ten or 15 years in the demand for coal for home consumption and coastwise and foreign bunkers, the increase in the coal required for power stations being balanced by the reductions in demand for other purposes. The market for exporting British coal at competitive prices is likely to be difficult.

In Table 3, figures are given in millions of tons of coal equivalent for the total consumption of coal, oil and hydro-electricity for fuel and power within the United Kingdom for the years 1947 to 1956. The coal equivalents for oil have been calculated on the basis of 1.7 tons of coal per ton of oil used as aviation fuel, motor spirit, kerosene, gas/diesel oil (including road vehicle fuel), fuel oil, and including fuel oils and gas consumed at petroleum refineries; petroleum products not used as fuels are not included.

Over the period 1947 to 1956, the coal equivalent of the total consumption of fuel and power in the United Kingdom rose by 50 mill. tons or by nearly

TABLE 3.—PRIMARY FUEL CONSUMPTION WITHIN THE U.K. FOR THE YEARS 1947 TO 1956
(MILLION TONS OF COAL EQUIVALENT)

Year	Coal	Oil	Hydro-electricity	Total
1947.. ..	184·4	18·5	·7	203·6
1948.. ..	191·9	19·3	·9	212.1
1949.. ..	193·4	20·5	·8	214·7
1950.. ..	201·0	22·7	·9	224·6
1951.. ..	206·5	25·0	1·0	232·5
1952.. ..	204·8	26·1	1·0	231·9
1953.. ..	206·4	28·3	1·0	235·7
1954.. ..	213·1	31·4	1·3	245·8
1955.. ..	213·8	35·0	1·0	249·8
1956.. ..	214·5	38·0	1·2	253·7

25%, from 203.6 to 253.7 mill. tons a year. Of this increase in coal equivalent, 30 mill. tons was as coal, 19.5 mill. tons as oil and .5 mill. tons as hydro-electricity. The increase of 30 mill. tons of coal was due to expansions in the electricity supply, coke-oven and gas industry in that descending order of magnitude. The increase of 19.5 mill. tons in the coal equivalent of the oils consumed as fuels included the equivalent of 2.5 mill. tons as aviation fuel, 2.9 mill. tons as motor spirit, 1.8 mill. tons for the diesel engines of road vehicles, 3 mill. tons as fuel at petroleum refineries and 9.3 mill. tons as fuel for industrial, commercial and domestic heating.

It is interesting to compare the changes in total fuel consumption over the period 1947 to 1956 with the changes during the period immediately preceding the 1939-45 war. In 1929, the coal equivalent of the total inland fuel consumption was 184.6 mill. tons. The quantity then decreased to 162.3 mill. tons in 1932, rose to reach 198.1 mill. tons in 1937 and then fell to 189.2 mill. tons in 1938. Over the period 1929 to 1938, the coal equivalent of hydro-electricity rose from .1 mill. to .7 mill. tons a year, and the equivalent of the oils used as fuels increased continuously from 7.2 mill. tons in 1929 to 13 mill tons in 1938.

If the total inland consumption of fuel and power continued to rise as rapidly during the next ten to 20 years as during the period 1947 to 1956, there would be required the equivalent of between 300 and 315 mill. tons of coal a year in 1965 and between 350 and 390 mill. tons in 1975. There is little doubt that

over the next ten to 20 years there will be fluctuations, up and down, in the total demand for fuel and power in the United Kingdom, with an overall average increase. In the opinion of the author, the rate of increase will be appreciably lower than during 1947 to 1956. The author's guess is that by 1968-70 the total inland consumption will be equivalent to an amount in the region of 275 to 280 mill. tons of coal a year, that is about 25 mill. tons more than in 1956. This additional demand will probably be met by the equivalent of approximately 15 mill. tons of coal as electricity from nuclear power stations and 10 mill. tons from the additional use of about 6 mill. tons of petroleum oils. This guess is lower than the tentative forecasts of other writers of the last few years, but it seems to the author to be more realistic.

If wages and salaries paid continue to rise faster than productivity, there must be increases in the prices of fuels and power. It is almost certain in such circumstances that the relative rises in the cost of coal to consumers will be greater than the rises in the costs of the more refined and more convenient fuels, electricity, oil and gas. In consequence, upward movements of prices will accelerate the growth in the use of electricity, oil and gas in place of solid fuels. The operation of the Clean Air Act, 1956, towards reduction in the emission of smoke and grit and dust will have a similar effect.

With rising prices and increased competition in home and overseas markets, efficiency in the use of fuels and of the heat and power derived from them will increase in importance. The total costs of fuel and power are of greater significance than is often recognized. The total amount paid for coal, coke, oil, electricity and gas (excluding tax on oils) by industrial and domestic consumers in this country is in the region of £2,000 mill. a year or about 12% of the national income. Clearly we cannot afford to waste fuel.

GAZ DE FRANCE STATISTICS

GAZ DE FRANCE has published its statistics for 1957 in a new form—an attractive brochure, 11 in. by 8 in., containing 76 pages of tables and about 30 of comment, illustrated by maps, graphs and photographs in colour.

For the first time the data relating to gas are presented in the new unit, the Thermie, the heat content of 1 cubic metre of dry gas at 0°C. and atmospheric pressure (see 'GAS JOURNAL' September 8, 1954 p. 575), which is approximately equal to .04 therms.

The national figures are compared with those of 1947, the first complete year of the nationalised industry, with those of 1951, the year which formed the basis of the ten-year plan, and with those of the two years immediately preceding the year under review.

Total sales in all categories rose from 13,636 in 1956 to 14,308 mill. thermies (say 572 mill. therms) in 1957, an increase of nearly 5%. The increase over 1947 was nearly 53% corresponding to a mean annual growth of 4.3%.

Sales to domestic consumers reached a total of 8,766 mill. thermies, an increase of 3.03% over the preceding year, an excellent result in view of the severe weather of February, 1956, and the extra day that year. Over the ten years the mean annual increase in this field is slightly less than 3%. Consumption per consumer, after some stagnation between 1947 and 1951, has steadily risen to the figure of 1,703 thermies (say 68 therms). Domestic sales account for 61% of the total sales of Gaz de France.

The effect of the mild weather during 1957 as compared with the severities of 1956 is even more marked in the commercial market where gas sales show an increase of only 2%. But since 1947 the mean annual increase has been about 8%.

Sales of gas to industrial consumers continue to grow. Ten years ago sales in this field were less than 13%; they reached 22% in 1957. And in total, the mean annual increase has been 8.5% over this period, a rate of increase, it is noted, double that in over-all sales. The annual increases for 1956 and 1957 were 13.2 and 12.1% respectively. It is noted too that, while gas represents as yet only a small fraction (4 to 5%) of the total thermal energy utilised in industry, this fraction is expected to continue to grow particularly when in the next few years natural gas will reach the market in large quantities. Notable individual increases in 1957 were 9.2% in the production and treatment of metals in mechanical and electrical engineering, 13% in the glass industry and 15.5% in the industries of ceramics and materials of construction.

Sales of coke during 1957 follow the low figures of all solid fuels during that year, showing a decrease of 5% from those of 1956. The graph of sales from 1947 to date exhibits marked fluctuations. On the other hand tar and allied products did very well. Road tar sales increased by 7%, pitch (for the manufacture of briquettes from fine coal and for that of electrodes) rose by 9% over 1956 and by 50% over 1955. Tar oils, mostly exported, met severe competition in world markets and suffered a decrease of 15% compared with 1956, but nevertheless remained 29% above the level of 1955.

Of the 16,129 mill. thermies sent out, 14,308 were sold leaving 1,821 unaccounted for. From coal, oil or coke, 10,676 mill. thermies were manufactured while 5,027 were purchased from French and Sarrois cokeries, 286 were imported, 794 were purchased natural gas while 13 were accounted for by undertakings still not nationalised. It is noted that 310 mill. thermies of coke oven gas had been stocked in the underground storage of Beynes by the end of 1956.

With regard to materials, coal carbonised (4,570,892 metric tons) was down about 3% but the tonnage of petroleum products used in the form of oils, propane, butane and refinery gases distributed direct or used in the manufacture of gas increased by 33%. During 1957, ten undertakings were converted to the use of propane-air or pure propane.

From a paper to the Wales and Monmouthshire Junior Gas Association, Chepstow, October 2.

Changes and Developments

By T. E. TYRRELL, A.S.M.A., Assoc.M.Inst.Gas E.,

DOMESTIC SALES AND SERVICE OFFICER, WALES GAS BOARD.

IT is perhaps not entirely without significance, that I should be asked to address a meeting of the Wales and Monmouthshire Junior Gas Association —primarily a technical body—on the subject of sales. No matter what your primary duties in this industry might be, if you persuade yourself that sales are no concern of yours, you are not likely to prove much of an asset or an ally in the highly competitive period in which we now find ourselves.

Expansion a Certainty

Any historical review of the gas industry must recognise that primarily it is an industry built around the discovery of certain chemical facts which requires technical and mechanical processes to maintain their operation. It follows logically that such plants require the supervision of trained engineers not only to control these processes, but also to devise ways and means by which progress and improvements can constantly be sought. The tremendous field of industrial development which faced this country at about the time the industry was founded made its rapid expansion a certainty. No great level of salesmanship was needed to dispose of the new fuel—indeed, the difficulty lay in the ability of the engineer to erect and provide adequate plant to meet the ever increasing quantities which were being demanded. This very fact, and the complete absence of any substantial form of competition was responsible for an almost complete cessation of technical research and development as we understand it today. This attitude was probably the cause of the very indifferent progress in appliance design. Enjoying, as it did, a virtual monopoly in the lighting and cooking loads, and a reasonable proportion of the heating load also, which lasted until the late twenties of the present century, it was not surprising that the industry did not take the threat to the domestic load by electricity too seriously at first. With the great depression came a period of highly competitive selling. Less than ten years later the second world war intervened, and by force of circumstances we were back to almost the same conditions which had prevailed at the time of the gas industry's monopoly. To begin with there was a shortage of all forms of fuel—a consumer needed a certificate from a doctor or a parson or some other responsible person before he or she could be sold an appliance out of the precious 'allocation'—district complaints could be answered by the shortage of steel and other materials, and the more irate customers silenced by 'don't you know there's a war on'? None of these things could be helped, but, followed immediately after the war by Government restrictions on credit and very heavy purchase tax, these conditions bred in us all a feeling which found solace for our lack of endeavour in the thought that if we made no effort to sell we were only doing what the Government wanted. Unfortunately, this attitude of mind often persisted long after the conditions which first prompted it had disappeared.

We are all concerned with selling a heat service, and we can disabuse ourselves forever that because we have been supplying the housewife with gas for the last 40 years we can complacently expect to continue to enjoy our share of her housekeeping money. Our inability to increase our domestic sales expressed as therms per consumer, is most disappointing, notwithstanding the substantial sales of those appliances from which we would expect the extra gas consumption. This can only be explained by loss of part of our cooking and water heating loads to electricity, and the loss of part of our space heating load to oil. Unfortunately, it was only two years ago that the recording of the types of competitive appliances in a consumer's home was introduced and while many undertakings have made an effort to collect and record this information, some undertakings have not even commenced such a survey, so there is a complete absence of reliable information on this matter. What we do know, however, is that the level of cooker production between gas and electricity has changed from eight to two in favour of gas to its present level of 5.5 to 3.5. So that, in a dwindling market electricity has very considerably increased its proportion. No accurate figures are available for the sale of oil heaters over the last few years, but from the information available from manufacturers it must have reached astronomical proportions. The complete lack in many undertakings of regular consumer contact has the effect of postponing the true realisation of the inroads being made by our competitors.

What Gas Can Do

A great deal has been done by the Board since vesting day to ensure that adequate supplies of high quality gas are available for development. So that it is safe to say that we have available reasonably adequate supplies of a high grade fuel at prices which are generally competitive. But the matter cannot end there. We can only expect to dispose of our product if we go to our consumers—particularly our industrial consumers who perhaps are our most discerning purchasers—and tell them what gas can do and the price at which it can be made available. The phenomenal success of the development of the industrial use of gas has been brought about by the commendable

manner in which the benefits of gas have continually been indicated to industrialists all over Wales.

Among the three classes of engineers within our industry—production, distribution and industrial—the industrial engineer is, by virtue of his duties, the nearest approach to the ideal merging of commercial enterprise and technical ability. Before nationalisation, most undertakings required the services of a qualified production engineer, and in all except the largest undertakings, this meant that in addition to his engineering duties, he was called upon to manage the administration and commercial life of his undertaking also. In many cases the appointment of Engineer and Manager was given to a man straight from the gasworks with no commercial background or training of any description. There are outstanding examples of men who possessed considerable natural commercial ability in addition to technical brilliance, but generally speaking managers were preoccupied with that aspect of their duties for which they were fitted by training and vocation and left the responsibility for sales development to the chief clerk or some other official already fully occupied with his normal duties. The value of the retort house as the only profit maker was a much misused half truth. Those days are gone. We must realise that we are a big business purely in the sales market. This is an era of specialists, and the craft of selling must be learnt as assiduously as Boyle's Law or Pole's Formula was in the past. Indeed, in our own area with its grid supplies, what opportunity is there for a manager with production engineering training to practise his profession But what an opportunity awaits the man with the technical 'know how' *and* commercial enterprise.

Spectacular Development

But the future of the Board is neither one of unrelieved gloom nor pessimism. That would be impossible in any concern which has increased its sales of gas by 28.5% between vesting day and the end of its last financial year. But the big increases in gas consumption has been in the spectacular development in industrial sales which account for 62.1% of this total. Although the undertakings have played their part in this development, a very large share of the credit must go to the Industrial and Commercial Gas Engineer, Mr. Tarn, and his team for their untiring efforts. The development of a balanced distribution load is essential and to do so the average consumption per domestic consumer must be improved. That this can be done is indicated by the figure of average domestic consumption per consumer per year shown in Table 1, which have been taken from a few isolated undertakings over the last few years.

TABLE 1

Undertaking	Year 1954	1955	1956	1957	1958
Abercarn	84	79	87	89	91
Rhymney & Aber ..	101	108	110	110	112
Quakers Yard ..	90	96	101	107	109
Merthyr Vale	94	97	103	107	111
Aberdare	68	68	74	72	79
Rhondda	87	90	90	91	94
Milford Haven ..	82	87	85	83	89

There have been little or no exceptional economic circumstances to explain this development and, therefore, it might be assumed that the same enterprising approach to sales has been applied to the domestic consumers in these undertakings. An increase in domestic consumption can only be achieved in two ways. The sales of additional gas consuming equipment, or the greater use of existing appliances. But in the case of gas cookers, sales of new appliances to replace existing inefficient appliances do not automatically lead to an increase in consumption. In fact, in many cases the reverse is the case; but the importance of replacing worn out and obsolete appliances cannot be over emphasised, since this is the market towards which our competitors are directing their considerable sales effort. Every possible type of appliance must be publicised so that the level of appliance sales can easily justify any sales organisation as a separate economic unit in the undertaking's accounts. The greater use of existing appliances is a little more difficult of attainment, but even so it is most noticeable that many undertakings made little or no attempt to make full use of the competitive position they found themselves in with the introduction of the Board's two part tariff.

District Selling

In many cases it has been found that up to quite recently district sales were non-existent—generally because district sales staff were non-existent also. Our proportion of prepayment consumers are about 85% of our total domestic consumers. Here numerically is our greatest potential source of business. Since these consumers seldom come to the showroom, is it not logical that we take our appliances to them? This lack of district selling staff has often been reflected in the inability to get gas into houses being erected by private enterprise. There has been much greater success with the Local Authorities, since in many cases the approach has come from the local surveyor. New houses must be carcassed while under construction, since there is very little opportunity of getting it done once the consumer has taken possession. It is therefore worth repeating the official Government viewpoint on the question of fuel supplied to estates as recorded in a Ministry of Housing circular: 'A decision to service a housing estate with only one of these two fuels (gas and electricity) to the complete exclusion of the other is prejudicial to the co-ordinated development of both industries and deprives consumers of the freedom of choice to which they are entitled.'

Further it is not enough to ensure that an adequate number of points are put in. To justify the capital outlay involved, a sufficient number of appliances must be installed which will *as a bare minimum* consume the 100 therms a year which are required.

Every sale makes a contribution either to the retention of our existing load or the exploitation of new consumption. The greatest opportunity for rapid development is without question, the space heating load. The psychological centre of the home is no longer the fire place, and, therefore, the open hearth and the solid fuel fire are no longer relevant. The Board have gone to considerable trouble to persuade its own employees that gas in most cases is cheaper, and, in every case, more convenient, for living room heating. So 20 or so employees, in as many selected undertakings, have had

an opportunity of having installed, free of charge, a modern convector fire in their own living room, to prove the truth of these assertions. These fires have been in use for more than a year, and there is no record of any of them being replaced by a solid fuel grate.

The decision of many architects and builders to install warm air units for complete house heating is another encouraging sign. The Board held a short course for managers early this year to ensure that they know as much as possible about this all important form of development, since it was of the opinion it would be the responsibility of the undertakings themselves to install and maintain these units. This is a vast new market which calls for something more than the average domestic salesman can be expected successfully to exploit. More than 100 Halcyon heaters will be installed before the end of this year, and the Board is dealing with an ever increasing number of enquiries for Radiation duct air units. In most cases, the enquiry comes to the firm concerned direct from the architect. It may be that insufficient information has been sent out to undertakings, but expert advice on any scheme is immediately available, and generally speaking all that is required is the initial enquiry. But what these new processes can do *must* be told to *every* prospective customer in your area. That is the task of every member of the undertakings' staff who comes into contact with the public.

The engineer, too, must play his full part in any large scale development of gas sales. Adequate supplies of gas must be available whenever the consumer requires it. Often in the past, mains of inadequate size were laid and the development of a new load, such as instantaneous water heating, made demands on a distribution system which it could not always meet. This must be rectified since the present problem is one of developing sales in existing properties, and the consumers' requirements must be the chief consideration.

DISCUSSION

Mr. Hanford (Port Talbot) the President of the Association, opening the discussion, asked Mr. Tyrrell for his views on the sales staff position in Wales.

Mr. Tyrrell said they were in a transitional stage in Wales. The total number of sales staff was inadequate. Generally speaking, it was the manager's responsibility to see that his undertaking was adequately staffed. As far as training was concerned there was recently introduced an Institute of Gas Engineers certificate in salesmanship and consumer service, and in many ways it was an excellent qualification because it gave a man the opportunity of obtaining essential technical knowledge in as short as possible time, but it seemed that this type of training was only applicable to certain types of undertaking. It was more use to the man or woman who intended going on in that particular line of study.

Mr. C. J. Pope (Rhondda) asked whether it was better to start a fitter as a salesman or a salesman as a salesman. He also criticised the figures relating to average consumption per domestic consumer, pointing out that they could be misleading unless certain factors, not mentioned in the paper were taken into account. He also pointed out that when the sales were made someone had to fit the appliances. This was a serious difficulty and sales had to be regulated to the fitting staff.

Mr. Tyrrell said that the discussion of this figure of domestic consumption was unimportant since there was an upward trend generally in the South Wales coalfield. Whether a fitter was a good salesman was the sort of thing no one could answer. If a fitter had the technical knowledge and a sales ability obviously he had an advantage, but he was more concerned with the salesman's ability to sell rather than having an adequate technical background. As far as accountancy was concerned, one of Mr. Tyrrell's first difficulties was to ensure that the chief accountant of the Board could afford the scheme and whether he was enthusiastic about it.

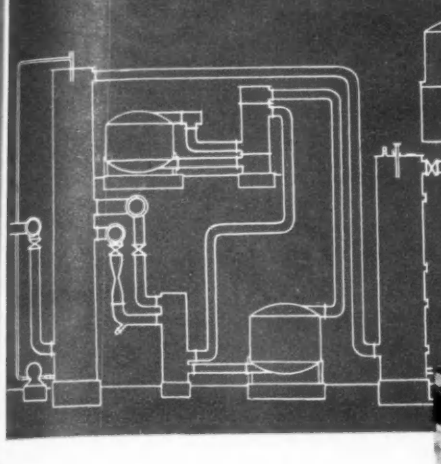
On the question of regulating sales to the fitting staff, Mr. Tyrrell said, 'I hope it is not suggested we should now stop selling.' For far too long they had geared their systems and schemes to a level of sales which they had operated for a very long time. Now they would have to gear themselves up to an entirely new level of business. Ways and means would have to be found somehow in all undertakings to cope with the new level of work. A customer should be told what delay there was likely to be before an appliance could be fitted. 'I would like to think everybody on the sales staff was provided every day with the information so they could go on the district and tell the consumer how long he had to wait. But, for goodness sake, don't let's start talking about stopping selling after only three weeks. There's no future in that,' added Mr. Tyrrell.

Mr. R. B. Garside (Grangetown) said he had heard that the N.C.B. had lost 5 mill. tons of coal in domestic sales due to the purchase of oil heating appliances. The attractiveness of the coal fire was on the wane, and perhaps the gas industry could get quite a lot of the load that had gone to oil. If the Board could cut the margin of profit on the original sale of appliances it could raise the therms per domestic consumer quite rapidly and soon get the initial loss back in the higher domestic load. Once the appliance was fitted it would be used and would advertise itself.

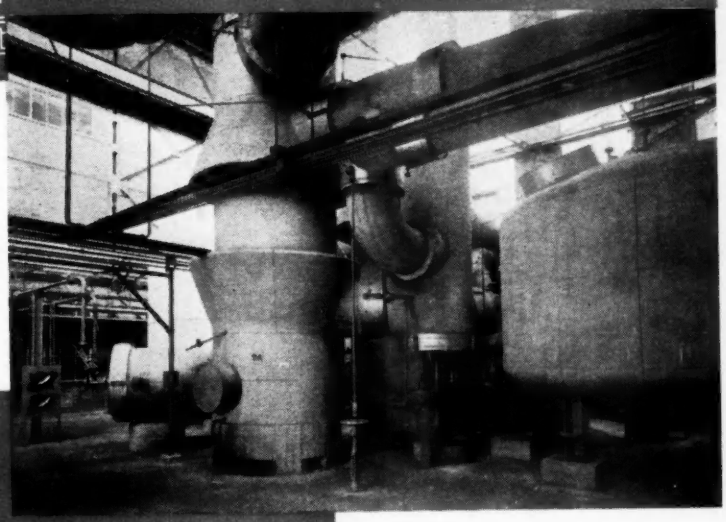
Mr. Tyrrell replied that the most recent Budget had levelled the purchase tax on all types of heaters, and the gas industry were not now labouring under unfair competition. If they wanted to be outlaws they could reduce the prices of appliances, but it had to be remembered that for many years people had complained at the discrepancies of prices in different parts of the country. The manufacturers also wanted the prices uniform so that they could advertise their wares nationally. The efficient space heater had been far too expensive and the concession certificate which enabled the purchaser of the gas cooker to have some assistance towards the fairly high deposit on a gas fire had been of great help to the gas industry in Wales.

Mr. J. F. Day (Pontypool) asked whether the gas industry was too honest in its advertising and whether it should take a lead from the car and washing powder manufacturers and overstate their case a little.

Mr. Tyrrell: 'I don't think it is possible to be really promotional and scrupulously honest in your advertising. You have to gild the lily a little, and in Wales



CO Conversion
CO_2 Absorption



34 units

.... with a combined output exceeding 120,000,000 cu. ft/day have been installed most of which also incorporate processes for the absorption of CO_2 and for the final removal of CO and CO_2 under pressures varying between 300 lbs. per sq. in. and 5,500 lbs. per sq. in.

CO conversion plant, total installed capacity 17,000,000 cu. ft/day.

The Power-Gas Corporation Limited have had over 30 years experience in the design, installation and commissioning of CO conversion plant and associated high pressure processes for the chemical and allied industries in all parts of the world.

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Rotary Water Strainers

Size "N" for 3,500,000 g.p.h.

The Hick Hargreaves self-cleaning enclosed Rotary Water Strainer is proving, in service throughout the world, to be the most effective means of removing floating debris. The Strainer comprises a motor driven wheel, slowly rotating inside a casing, the straining medium which is between the spokes being so designed to prevent the interlacing of fibrous matter. The head loss through the strainer does not exceed 2 feet. The debris is removed from the strainer by a series of jets, and discharged from an internal chamber which is effectively sealed off from the main water space. All water connections are placed in the lower half of the casing and large access doors are provided for routine examination. Installation is extremely simple, no extensive foundation work being necessary. The strainer can be located on either the suction or discharge side of the circulation water pumps.

The Hick Hargreaves Rotary Strainer is available in a range of capacities up to 5,000,000 g.p.h. with mesh of $\frac{1}{16}$″ to $\frac{1}{4}$″ diameter inscribed circle.

Hick Hargreaves

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H139A

we do rather tend to depart from national advertising which is more likely to be shot at. If you in your undertaking think the type of advertising that's going on is not effective enough there is nothing to stop you changing it and making it more promotional if you think it is necessary.'

Mr. D. I. Rowlands (Caerphilly): 'What is your view on the relative merits of television advertising?'

Mr. Tyrrell: 'All promotional advertising sets out to create a demand. If we are going to capitalise successfully on our advertising policy obviously it has got to be a combined effort and nobody must back out of it. We do the advertising—you have to produce the results.'

Mr. P. C. Forbes (Swansea) said there had been a shift of emphasis in sales from the showrooms to the district. Both the oil and electricity industry were engaging well qualified and well educated salesmen to promote their sales. With the change of emphasis from engineering matters to sales matters was the gas industry paying sufficient attention to the status and terms of remuneration of its salesmen? There were apprentice gas engineers and distribution engineers why not apprentice salesmen?

Mr. Tyrrell: 'I am not speaking in any derogatory terms because our development gas sales have shown an upward trend which is entirely at variance with the national domestic trend, but it seems to me that the general standard of personnel we have on district sales could be improved. There is an urgent need for the right type of salesman and we shall have to give careful thought to the question of payment of commissions to sales staff. I think we shall have to get the co-operation of the unions on this but generally speaking the trend has got to be towards getting more sales from existing staff rather than engaging more sales staff.

'Some undertakings are going into the question of taking on pupil gas salesmen. If this is extended so that young men can be attracted at 17 or 18 at the sort of salary that will compete with what is being offered by everyone else it might be our salvation.'

Mr. W. Bevan (Rhymney and Aber) asked why the electrical industry had caught up on the gas industry in selling cookers. He also asked whether the training of salesmen could concentrate more on salesmanship than on technical details.

Mr. Tyrrell said it was wrong to inflict a parochial point of view on a national concern. Although in Wales, where there was little production worth speaking of, most salesmen would have little opportunity of learning much about the operation of a gas works, the certificate was designed for salesmen all over the country. The syllabus had been overhauled and the technical standards lowered but the certificate was excellent for those people who intended to make some sort of progress in the industry in that particular line. Referring to the sales of cookers, Mr. Tyrrell added, 'I am not rising to that one. The figures are there. Perhaps they have made a greater effort or have a better sales organisation.'

Mr. H. W. Scott (Barry) asked whether the considerable amount of advertising done by electricity industry was not responsible.

Mr. Tyrrell replied that he spent as much money as he could get out of the Board. In the past two years that had doubled. The electrical manufacturers generally were bigger organisations than the gas manufacturers so the level of spending was greater. More important, the manufacturer had certain plants capable of producing certain quantities. While the demand of the gas industry was able to meet that output they were not over interested in developing their sales. The gas industry in their turn had been satisfied with the level of sales.

Mr. F. A. G. Westwood asked whether the acres of wall space on the undertaking's premises could not be used for poster advertising and whether trade-in allowances could be extended to central heating boilers.

Mr. Tyrrell said one had to relate the trade-in allowance to the type of load one expected to get and as far as hoardings were concerned 16 posters would be provided.

Steel for Pressure Vessels

THE revised British Standard for steel for land boilers, receivers and other pressure vessels (B.S. 1633:1958) deals with the plates, sections, bars, rivet bars, and rivets used in the construction of land boilers, receivers and other pressure vessels. A rearrangement of contents (into two sections—for general and specific requirements, respectively) makes for simpler and quicker interpretation of the requirements for the six grades of material.

Among the subjects dealt with under the general section are manufacturing margins, marking, testing. Another section deals principally with chemical composition, heat treatment and mechanical properties of the steel. An interesting feature of the publication is an appendix which gives the ratio of the 0.2% proof stress at elevated temperatures to the minimum specified tensile strength at room temperature. Further appendices include the metric equivalents of the rolling margins for plates, and details of the tensile test pieces extracted from B.S. 18 (Tensile testing of metals).

B.S. for Worm Gear Units

A NEW British Standard for dimensions for worm gear units (B.S. 3027:1958) specifies the principal external and mounting dimensions for worm gear units of 4 in., 6 in. and 8 in. centre distances. Its requirements are similar to those already worked to by the gear manufacturing industry—hence their embodiment in this national standard should promote interchangeability between the products of different makers.

The publication has two appendices: The first lists preferred nominal gear ratios; the second draws attention to the information which should be included in an order. The information plate on each unit is required to bear the 'B.S. number' in association with the size designation shown in the standard, and particulars of the gear ratios.

I.G.U. ROME—
'Gas Journal' Abstract

SESSION 5 A

Review of Technical Sessions

Concluded from October 29, page 224

IGU/14-58 Difficulties, Damage and Danger to Supply Systems during the Coldest Winter Season.
Report by the Italian Association.

IGU/25-58 Economics of High B.t.u. Oil Gas.
Paper by Hall M. Henry, President, Negea Service Corporation, U.S.A.

IGU/45-58 Plastometric Methods at the Coke Oven Plant at Basle.
Paper by W. Devecchi, Engineer Chemist, Basle, Switzerland.

WINTER RAVAGES AND REMEDIES

A LONG and detailed questionnaire was issued by the Italian Gas Association to 13 member countries, who returned replies from a number of selected undertakings. These cover details of the climatic conditions in each case, the number of complaints and the organisation to deal with them; troubles (and the remedies applied) with gasholders, district governors, distribution systems, services and meters.

One may infer from the replies that where intense winter cold is usual, measures to deal with possible difficulties are successful. For instance, Ekilstuna (Sweden), the coldest of the towns consulted, reported an insignificant number of complaints even when mean daily temperatures went down to −23°C. and even though the gas distributed contained a normal percentage of humidity. Troubles with services are generally due to ice, rarely to naphthalene. Size seems to be important. Paris reported no obstruction of importance with lead services over 50 mm. diameter nor in steel pipes above 65 mm. In nearly all the towns using cast iron mains ruptures occur during the winter, usually at the thaw. Generally it is concluded that main-laying at a sufficient depth affords adequate protection—0.80 to 1.20 metres in climates not excessively rigorous, to 1.80 metres in cold climates, as in Sweden.

The general picture is therefore satisfactory, but the reports emphasise that any difficulties militate against the popularity of gas and that in every undertaking there should be an effective organisation to deal with them promptly and efficiently. Of remedial methods, the distribution of dry gas is recommended, but with due warning against its use in old systems. Paris has used with success the injection of alcohol or methanol.

In new systems, it should be possible to eliminate almost completely the consequences of cold by the adoption of features analogous to those followed for a long time in certain towns with rigorous climatic conditions. These features are set out in the report.

The reporters are of the opinion that, in principle, if climatic conditions render it necessary, economic and all other considerations should take second place to the necessity to adopt all necessary constructional measures to ensure a regular service even during long periods of severe winter conditions.

HIGH B.T.U. OIL GAS

Experience in the production from oil of gas at a high calorific value, reported upon by Hall M. Henry, will be of interest and some guidance to those European countries, as for instance France, where it is proposed to distribute natural gas direct to consumers and where peak load plant will be necessary. The report deals mainly with the economics of the question, but some operating problems are considered and a number of plants are described with diagrams—a feature which provides useful reference for technologists.

The high calorific content per unit of volume makes for economy in several directions—capital investment, production costs and distribution capacity. Even if oil is used in the production of c.w.g. it is claimed that the capital cost is reduced 50% when the c.v. of gas produced is say 1,000 B.t.u. as against 520 B.t.u. per cu.ft. 'Exhibit No. 16' is a table contributed by the Koppers Company giving comparative costs per therm in dollars and in the U.S.A. of a number of different processes. Economies in holder and distribution costs are obvious, but these would appear to be most fully realised in districts where it is already the practice, or proposed in the future, to distribute natural gas at equivalent calorific values. In other districts these would be offset by costs of conversion of appliances. A number of concrete examples in the U.S.A. are fully analysed. The conclusions, from experience to date and with available data, are that high B.t.u. oil gas has resulted in substantial economies to the gas companies who have pursued this policy.

COAL SWELLING MEASUREMENT

A plastometric method for the measurement of the swelling property of coals, in use at Basle, is described by Engineer-Chemist Devecchi, of that undertaking. It has enabled the technologist to determine with sufficient accuracy the best blending ratios for the different coals available.

The apparatus used is described with drawing and photograph. It consists of a weighted plunger resting upon a small sample of coal in a heated vessel. The position of the weight on a yard-arm terminating in a pen-recorder indicates the swelling strength of the sample under investigation plotted against temperature.

I.G.U. ROME—
'Gas Journal' Abstract

SESSION 5 B

IGU/6-58 **Reconditioning Old Natural Rubber Joints in Distribution Networks.**
Report by the Belgian Association.

IGU/15-58 **Problems connected with the Odorisation of Different Types of Gas.**
Report by the Italian Association

IGU/41-58 **Flame Stability and Interchangeability of Gases.**
Paper by J. C. Theron, Chief of Industrial Gas Laboratories, Staatsmijnen in Limberg Netherlands, and Prof. Dr. D. W. van Krevelen, Director of the Central Laboratories.

IGU/43-58 **Optimum Economics of a Supply with a Mixture of Gases.**
Paper by H. A. A. de Melverda, Netherlands.

RECONDITIONING RUBBER JOINTS

The Royal Belgian Gas Association was entrusted with the task of circulating a questionnaire to member countries for information on two points of special interest connected with rubber joints in gas mains. These concerned the reconditioning of old natural rubber joints in leaking gas mains, and a study of the composition of rubber jointing material generally, which included control tests for its use in gas mains. The report under review is drawn up from the replies received.

Gas engineers in Belgium and France had noticed that gas leaks were occurring in mains which were carrying gas of a different type to that traditionally received from gas works; and after an examination of faulty joints taken from the mains in question they came to the conclusion that debenzolised coke oven gas and other 'new gases'—propane-air, etc.—were attacking the joints and causing them to lose their elasticity. The report puts forward three possible methods by which the natural condition of such joints might be restored *in situ*. These depend on the injection into the gas stream of some suitable agent, either gaseous or in a finely divided state.

The first method mentioned was to benzolise the gas to an optimum degree, far below saturation point. The maximum suggestion was 20 to 25 gr. per cu. m., though the actual amount used in the experiments was 10 to 15 gr. per cu. m. (about .01 to .015 oz. per cu. ft.). If solvent naphtha were used, the proportion might be reduced to about a fifth of the amount.

The second method was to humidify the gas by blowing-in small amounts of superheated steam. Such a process had been worked out in America, when the change from humid manufactured gas to dry natural gas had to be made, to prevent damage to valves, etc., from dry solid matter. The principle involved was to protect the joints from the desiccating effect of the 'new gases.' The third method was 'fogging' with oil. This too was well known in America.

For each method, details are given of the process and plant used in introducing the reconditioning agent.

The general conclusions were that of the three methods humidifying was the easiest to carry out and was free from any danger, while the other two needed careful supervision. In France rebenzolising is considered a satisfactory solution until a better can be found. However, it is generally thought that need for suppleness in these joints is no longer necessary, and other material unaffected by present-day gases could be used successfully.

Since there is no knowledge of any tests carried out recently in Belgium to investigate the composition of joints, the last part of the report is confined to advice and suggestions given by members of the Committee set up to study the information received.

The general conclusions reached are that the means at the disposal of gas undertakings for solving the problems presented are not adequate, but that they supply a palliative until some more satisfactory means presents itself. New mains may be laid with natural rubber joints, but artificial rubber is tending to be used more and more with gas of a constant uniform composition. The results seem satisfactory.

DISCUSSION

The first part of this report was introduced by M. P. DECOUX (Belgium) and the second part by M. G. VANDEN BERGHE (Belgium) who raised the questions:—

1. Would it be possible to agree on desirable standard characteristics for a joint?
2. Could they consider the use of a new material?
3. When they manufactured a new joint could they not reconsider the assembly of the joint so as to simplify its replacement?

M. M. M. PILLOY (France) described experimental work being done in France on the fogging and humidification of mains, and said the results were very encouraging, giving much reduced leakage; but a few more months were required before they would be in a position to reach final conclusions.

An Italian representative of the Shell Oil Company asked which was the most suitable type of oil to use for fogging, and was told that this was largely a matter of local conditions.

The Chairman said the subjects covered by the report presented not only technical but economic problems.

MORE ABOUT ODORISATION

This report, submitted by the Italian Gas Association, co-ordinates the replies received in answer to a questionnaire sent to member countries asking for their views on the degree of town gas odour, its relation to safety and means of increasing it.

The conclusions are that great interest is being taken in this whole subject by all member countries. This was in spite of some countries—namely, Western Germany, Denmark, Spain and Sweden—having had so little experience that they could not contribute any valid data.

The majority of countries concerned had been faced for some time with the problem of distributed gas having either too little or no smell at all, and the consequent dangers from poisoning or explosion. The actual adding of the odour presents certain difficulties, and the degree of odorisation is almost impossible to measure, since it relies on the subjective judgment of the technician carrying out the test. This again largely influences, other things being equal, the choice of odorising agent. Gas with its own particular smell, if it is only slight, may for certain reasons have to have it increased to differ from other smells in the vicinity of utilisation. What type of smell should the gas be given? This raises the question as to whether the added smell is likely to become so habitual as to become undetectable and so ineffectual.

The permanence of any added odour is of supreme importance, and this was a difficulty experienced by all countries concerned. The odorising agent must not be absorbed by the main nor by the soil if leak detection is in progress. The intensity of odorisation must remain constant from the works to the consumer.

The report concludes that the odorisation of distributed gas gives no guarantee against possible accidents, and it is unlikely to be able to give the alarm of a gas leak to those asleep in the house.

DISCUSSION

Ing. M. SALES (Italy) said that odorisation had been introduced mainly to give warning of explosion risks of non-toxic gases having little smell. It had been only little used for toxic gases, possibly because these had a distinct natural smell. There were many good odorants available but information was required as to which was the best for any particular usage.

There were two basic methods of introducing odorants—first by injection; secondly by evaporation. Some methods provided for automatic concentration control in relation to gas flow, while others were not conducive to automatic control.

It was very desirable to establish a scale of strength of odour, but this was difficult due to the lack of any instrument for measuring odour.

The conclusions reached by the Committee were:

1. Most countries showed interest in odorisation.
2. The types of odorants available were numerous.
3. There was difficulty in measuring the strength of odour.
4. Odorisation contributed to the security of the consumer.
5. Odorisation could not give complete protection because of the approach, with time, of insensibility to the odour.

Mr. L. W. ANDREW (G.B.) said he wished first to clear up a possible misunderstanding. The information shown as having been provided by Watson House did in fact include information provided by the South Eastern Gas Board and the Distribution Engineer of the North Thames Gas Board.

He also thought it desirable to draw attention to the table on p. 10 which showed the Coefficient of Safety in Great Britain as 10:1 and in Italy (and France) as 1:1. He believed this to be mainly due to the different methods of assessing the strength of odour. In Great Britain the threshold of smell was taken, and in Italy definite smell. On p. 12 there was a reference to adding odorant only by the evaporation method, but since the report was compiled the injection method had also been used in Great Britain.

He posed the question 'What can be done about measurement of smell?' Even though it must be subjective, might it not be possible to calibrate it objectively? For example, 1 lb. of tetrahydrothiophene in 1 mill. cu.ft. of gas might be taken to have an odorosity of 1

The most suitable odorant so far found for use in Great Britain was tetrahydrothiophene.

INTERCHANGEABILITY OF GASES

As the variety of gases available increases, the problem of their interchangeability in existing burners assumes greater importance. So that an idea may be formed of the suitability of any such gases, it has become necessary to devise dimensionless numbers or indices with which to measure their combustion characteristics.

There have been a number of workers in this field, both in France and America as well as in the United Kingdom, and the authors of this paper, J. C. Theron Mulder and Dr. D. W. van Krevelen, both of the Netherlands, have carried out work on the combustion of certain ternary gas mixtures to confirm the existing knowledge of the matter. The particular points investigated were the conditions of 'flash-back' and 'blow-off,' using the 'brûleur contrôleur type Gaz de France' burner, developed by Delbourg. The latter used the Wobbe number and the 'combustion potential' as indices for assessing combustion characteristics. Weaver, working in America, used a third index, in addition to the other two—the 'maximum burner velocity.' Both workers gave empirically derived formulæ for these indices, but the work of the authors of the paper under review shows that, from theoretical considerations, the form of these formulæ cannot possibly be correct, since their experimental evidence goes to prove that flame instability cannot be unequivocably defined by the Wobbe number, together with either of the other two indices. Later work by Delbourg gave certain correction factors, by the use of which the authors found their experimental work easier to describe. Other workers, both in the United Kingdom and America, have shown that flame instability is governed by the velocity gradient of the gas flow at the wall of the burner.

The present work confirms this both for 'flash-back' and 'blow-off.' Putnam, working in America, attempted to correlate 'flash-back' gradients with burning velocity. The authors confirm this on theoretical grounds, but their experiments show wide deviation from it. They account for this by the length-diameter ratio of the burner used. For most burners in use this ratio is small—that is, the length of the burner tube is usually only a few times the tube diameter, which makes it practically impossible to calculate the velocity gradient with reasonable accuracy.

The authors conclude that it is impossible to define the flame stability limits by means of the existing theories. As long as the laws governing the flames in this particular type of burner are unknown, empirical methods will have to be used to solve the problems met with in practice.

DISCUSSION

Mr. J. A. PRIGG (G.B.) referred to the new method of assessing interchangeability proposed by Prof. Krevelin (joint author) at a recent meeting in Oxford. The British method was a combination of those of Delbourg and of Weaver.

He recommended that a gas should always be practically examined because it was never possible entirely to

forecast its characteristics from theory. The characteristics considered important in Great Britain were Wobbe number, aeration number, reversion pressure and non-aerated flame height.

Interchangeability must be considered relatively to the tolerance of appliances in use in quantity.

The authors had separated the effects of 'blow-off' and 'blow-out.' In his view these were the same phenomenon.

The possibility of altering the pressure to compensate for gas characteristics, mentioned by the authors, would not be practicable in Great Britain because of the large number of appliances which were fitted with pressure governors. He then made references to work by Fuidge on design and tolerance of burners, and to the theoretical work of Lewis, von Elbe and Grumer.

M. A. BOLZINGER (France) stressed that it was necessary to fix limits within the practical range of 20 or 30 different kinds of appliances and of actual district pressures, and they must therefore establish average conditions which would ensure that the great majority of the appliances would work tolerantly. The methods of Delbourg and Weaver were very satisfactory from the practical point of view.

Prof. SCHUSTER (Germany) said that many small works were faced with the necessity to change gases, yet they had not the facilities to undertake proper investigation. Could simpler methods of determining limits be established—possibly by graphs or test burners?

Mr. MULLER agreed with M. Bolzinger that it was desirable to have a test burner, and they had adopted that used by Gaz de France. In answer to Prof. Schuster, he said the methods described in the report were not designed to be used directly by gas works; this would require further investigation.

ECONOMICS OF MIXED GAS SUPPLY

H. A. A. de Melverda of the Netherlands, in this most interesting paper discusses the economics of supplying gas from a base load plant and a peak load plant on the same works.

The whole subject is treated mathematically and the conclusions the author comes to are general and apply to no specific case other than the fundamental premises laid down at the beginning of the paper—namely, that his calculations are for the optimum quantities supplied from each source of gas, that the gases must be interchangeable, and that gas storage over long periods—underground storage—is not considered.

DISCUSSION

M. DE MELVERDA (Holland), introducing his paper, said he had written it in the hope of promoting a theory which he claimed was new and suitable for international application.

M. A. BOLZINGER (France) said that a similar theory had been applied in France since 1954 and had been used extensively, but it was one which was more in accord with reality because it took into account that plant and the supply of grid gas could not be started or stopped instantaneously.

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APPLICATIONS are invited from suitably qualified persons for the above-mentioned position. The commencing salary will be within Grades APT. 8/9 (£773/£927) of the National Salary Scales.

The post is pensionable, and the successful applicant will be required to pass a medical examination.

A house is available on reasonable terms under the Board's standard form of agreement.

The Wolverton District comprises the townships of Wolverton, Stony Stratford and Newport Pagnell.

Applications stating age and present position, and giving details of education, qualifications and experience, together with the names of two referees, should be addressed to reach the Group Manager, 45, Abington Street, Northampton, not later than November 18, 1958.

H. B. TAYLOR,
Divisional General Manager.

Millstone Lane,
Leicester.

October 28, 1958.

EAST MIDLANDS GAS BOARD
LINCOLNSHIRE DIVISION

TECHNICAL ASSISTANTS (PRODUCTION)
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APPLICATIONS are invited from suitably qualified persons for the position of Group Technical Assistant (Production) at each of the above Groups at a commencing salary within Grade A.P.T. 5/6/7 (£629/£813) p.a.

It would be an advantage to applicants if they are in possession of the Institution of Gas Engineers' Higher Grade Certificate in Gas Manufacture or equivalent qualifications. Additionally they should have had experience of modern vertical retort installations.

The post is superannuable and the successful applicant will be required to pass a medical examination. He will also be required to join the Board's Staff Pension Scheme.

Applications giving details of education, training and experience together with the names and addresses of two referees, and stating for which of the two localities you wish to be considered, should be addressed to reach the undersigned not later than November 17, 1958.

BERNARD CLARKE,
Divisional General Manager.

Belle Vue House,
Carline Road,
Lincoln.

EASTERN GAS BOARD
WATFORD DIVISION

ASSISTANT DISTRIBUTION SUPERINTENDENT, WATFORD DIVISION

APPLICATIONS are invited from suitably qualified persons for the above position. Applicants should have had experience in all practical aspects of distribution including High and Low Pressure Main and Service Work, and control of labour.

Commencing salary will be in grades A.P.T. 7/8 (Fringe Metropolitan, £753,873), with placing according to age and experience.

The successful candidate will be required to pass a medical examination, and unless already subject to a Pension Scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required, if eligible, to join the Board's Staff Pension Scheme within six months of taking up the appointment.

Applications, stating age, qualifications and experience, to be addressed to the undersigned and received not later than November 22, 1958.

T. C. BATTERSBY,
Divisional General Manager.

Radiant House,
Clarendon Road,
Watford.

FORD MOTOR COMPANY LIMITED have a vacancy for an ENGINEER, aged 26-35, in connection with the modernisation scheme for their COKE OVEN PLANT.

Applicants should have had drawing office experience in the design and layout of modern coke ovens and by-product plant in an engineering capacity as such, or the chemical engineering industry.

This is a well paid post, with participation in a generous non-contributory pension scheme.

Please send details of experience and qualifications to Training and Recruitment Department (012A) Ford Motor Company, Ltd., Dagenham, Essex, quoting reference TPE.

NORTHERN GAS BOARD
TEES-SIDE DIVISION

FOREMAN MAIN AND SERVICE LAYER—STOCKTON

APPLICATIONS are invited for the position of FOREMAN MAIN and SERVICE LAYER at the STOCKTON UNIT.

Applicants should be fully experienced in high and low pressure mainlaying and service laying and must be willing to carry out such overtime work as is necessary, for which the proper overtime rates will be paid.

The appointment is Intermediate Grade VI—Conditions 2, at £575/£620 per annum, and is superannuated under the Manual Workers' Pension Scheme.

The successful candidate will be required to undergo a Medical Examination.

Applications stating age and experience should be addressed to the undersigned and received not later than November 17, 1958. A dwelling-house may be available for the successful applicant at a reasonable rental.

JOHN W. PALLISTER,
Divisional General Manager.

(Post Office Box 4),
Gas Works,
Commercial Street,
Middlesbrough.

October 28, 1958.

SCOTTISH GAS BOARD
EDINBURGH AND SOUTH-EASTERN DIVISION
ASSISTANT ENGINEER

APPLICATIONS are invited for an Assistant Engineer, to act as personal assistant to the Deputy General Manager at the Divisional Headquarters in Edinburgh. Applicants must be corporate members of the Institution of Gas Engineers and have considerable experience of gas and coke manufacture and all ancillary operations. The successful candidate will be required to travel throughout the Division advising and assisting with all manufacturing problems.

The appointment is pensionable and subject to medical examination. Salary scale A.P.T. 12, £981 to £1,106 with placing according to qualifications and experience.

Applications giving age, education, qualifications, training and experience together with the names of two referees should be sent to The General Manager, 15, Calton Hill, Edinburgh, 1, within 14 days of the appearance of this advertisement.

WEST MIDLANDS GAS BOARD
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A flat, adjacent to the Gas Works, may be available as temporary accommodation, at a reasonable rental.

The salary for the appointment, which is pensionable, and subject to medical examination, will be within Group 'B' (£1,195-£1,355 per annum) of the National Salaries Table for Senior Gas Officers.

Applications, stating age, experience and qualifications, together with the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham, 15, to reach him not later than November 16, 1958.

J. SWAN,
Secretary to the Board.

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